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No. VII.

Some Observations on the Moulting of Birds. By George Ord.—Read March 7th, 1828.

THAT Birds, in general, annually shed their feathers, will not be disputed. This change takes place, in some species, in summer; in others, in the autumn. When the old feathers drop, their place is supplied by new ones, which, in some species, are of quite a different complexion from those that they succeed. But when, in the spring, a retrocession of colour is found to have taken place, naturalists have concluded, that these birds undergo a double moulting; for in no other way could they account for a change of colour, which has been supposed to be dependent on a change of plumage. The species which are usually domesticated have been said to moult but once a year*; because, not perceiving

* With respect to the genus *Anas*, the author of the *Manuel d'Ornithologie* expresses himself thus: “La mue, chez le plus grand nombre des espèces connues, a lieu deux fois l’année, en Juin et en Novembre. Les femelles muent plus tard que les mâles, *et peut-être ne le font-elles qu’une fois.*”—p. 314.

It here seems evident, that, in these remarks, Temminck would include the domestic geese. With us these valuable birds commence laying about the 1st of March; early in April they sit; and in May bring forth their young: the period of incubation being four weeks. Moulting then commences, and continues until August. In September they are pretty well fledged; and in November, the very season in which, agreeably to Temminck, the second moulting takes place, they are in full feather; and give frequent evidence of the fact by short flights, especially if dwelling near a lake or river. The same remarks are applicable to ducks.

any material change in their garb, it is inferred that no change is necessary; and yet if any notable mutation had obtained in any one of the domesticated species, it is probable it would be affirmed of that species, that there was some physical necessity for this exception, which did not hold of the rest.

Three great naturalists have given opinions on this part of the physiology of Birds, which do not altogether coincide with each other. From Buffon we learn that they moult but *once* a year*. Baron Cuvier says that their feathers fall *twice* a year†. And Temminck informs us, that, in some genera, the whole of the species are subject to a double change of plumage; in others, only some of the species experience it; whilst in the remainder, the moulting takes place but once a year‡.

The object of this inquiry is to ascertain, whether the opinion of Temminck, that some Birds§ change their plumage *twice* a year, is founded in fact.

The intention of Nature in renewing the covering of Birds, appears to be a revigoration of those powers which are necessary to the propagation and conservation of the animal. After the breeding season is passed, the period of moulting commences. The effects of this exhausting process, which, if not a disease||, is closely allied to it, are well known. When the Bird recovers its strength, we find it in a new garb, which advances to perfection in proportion to its necessities: those which migrate to great distances standing in need of a speedy

It seems that Temminck is doubtful whether the females moult more than once; this doubt has arisen, we presume, from his inability to discover any variation in their plumage.

* Discours sur la Nature des Oiseaux.

† Règne Animal, tome 1, p. 296.

‡ Manuel d'Ornithologie.

§ It is necessary to state, that I have reference to Birds only in a state of nature.

|| "La mue est pour tous les oiseaux un état de maladie, un tems de silence et de retraite: la plupart sont foibles et tristes pendant sa durée; quelques-uns sont très malades, et d'autres périssent; aucuns ne chantent tant qu'elle dure; ils se cachent, prennent peu d'ébats et se jouent plus rarement dans les airs, sur les arbres, ou dans les prairies."—*Mauduyt*.

maturation* ; whilst others continue in the act of moulting between three and four months.

The most perfect state of plumage is observed in the spring. Now, if we admit the fact of a vernal moulting, then must this moulting be characterized by other circumstances than those which obtain in the autumnal ; for, after the latter, the plumage requires several months to arrive at maturity ; and the Bird, in ridding itself of its excretions, finds itself in too exhausted a state to perform the functions of propagation. The spring moulting, therefore, so far from exercising any debilitating influence upon the physical powers of the Bird, should seem to afford them additional energy ; for this moulting is pretended to take place about the period of the sexual union, when all the powers of nature are in full vigour.

In those singing Birds which winter with us, we can perceive no diminution of vital energy during the vernal season, either as respects vigour of body, or capacity of voice. The *Fringilla tristis*, though migratory, frequently continues the whole year with us ; and his song, in the month of March, while yet his autumnal dress continues, is tuneful and animated. The change in his garb begins to appear in April ; and early in May, we behold him in his brilliant yellow plumage, which may be termed his bridal garniture, for shortly thereafter commences the period of nidification. During all this season of animation, his tuneful powers are unabated. In September, both sexes are nearly alike, for then they have moulted.

When the Reed-bird (*Emberiza oryzivora*) visits us in August, the male and female adults, as well as the young, so much resemble each other, that it is difficult to distinguish

* Many Birds change their feathers slowly, particularly their quills, so that they are not prevented from flying ; but wild swans and geese cast their plumage so rapidly, even their wing-feathers, that they are unable to fly for several weeks : hence, in the northern parts of our continent, where they breed, many of them become the prey of foxes, and the Indians ; and if they were not endued with extraordinary vigilance and sagacity, their race would stand a chance of becoming extinct.

them. But in May, in their return to their breeding places, the garb of the male is so totally dissimilar to that of the female, that many persons are doubtful whether or not they constitute the same species. This change begins to take place in March, the plumage at first assuming a mottled appearance; and in May, he exhibits the full party-coloured dress, which is the striking characteristic of his sex. But during the time that the male is undergoing this metamorphosis, there is no change of feathers: their colours being altogether the result of their organical secretions. This fact has been verified in many instances of these birds confined in cages or aviaries. Even if we had no means of experimenting upon this subject, analogical reasoning alone would not a little aid us in investigating the truth; for no person who has taken the trouble to keep Canaries, or Mocking-birds, will venture to affirm, that they shed their plumage, or moult, more than once a year.

So long ago as the year 1811, Wilson, in his history of the Carolina Parrot, in giving an account of the vernal change of the colours of the feathers of the young of the preceding year, asserted, that "*the colour changes without change of plumage.*" Had this excellent ornithologist been fully aware of the importance of this fact, it would, doubtless, have led him to an investigation, the result of which might have had a tendency to repress much of the absurdity which, since his time, has been promulgated on the subject of the moulting of Birds: for the authority of so experienced an observer, would have had greater weight than that of a mere compiler, or a closet naturalist.

In the year 1819, the Rev. William Whitear communicated to the Linnean Society of London, some "Remarks on the changes of the Plumage of Birds." These were published in the Transactions of that learned body. This gentleman, after detailing the result of observations which had been made, during the winter and spring, upon Mallards, Sandpipers, a Black-headed Gull, and some other birds, thus expresses himself:—"The above observations seem pretty strongly to

confirm the fact which Mr Youell has pointed out, namely, that a change in the colour of the plumage of Birds does not always arise from a change of feathers, but sometimes proceeds from the feathers themselves assuming at one season of the year a different colour from that which they have at another*."

The Rev. Dr Fleming, in his *Philosophy of Zoology*, corroborates the above opinion of the Rev. Mr Whitear's; but maintains, that, "in those species whose plumage changes colour with the season, the different moultings take place at corresponding periods." "In the autumn," continues he, "we find that the black feathers on the head of the *Larus ridibundus* change to a white colour. But besides the altered feathers, others spring up, of a white colour, to increase the quantity of clothing. This Gull has, therefore, during the winter, some of the feathers of the head old, and others young. Again, in spring the white feathers of the winter become black, and a few new feathers make their appearance, likewise of a black colour, to supply the place of the older ones, which drop off in succession. Some of the feathers on the head of this Gull are half a year older than others; and consequently, we may infer, will fall off sooner than those of more recent growth. From these, and similar facts, furnished by several species of British birds, we are disposed to conclude, that the feathers which are produced in autumn, and the beginning of winter, and which correspond with the conditions of the season, change their colour in spring, and continue in this state until they are shed in autumn. The feathers which are produced in spring, continue of the same hue during the summer, change their colour in winter, and fall off again upon the approach of spring. In this manner, the quantity of the plumage fit for the different seasons of the year is easily regulated; and it is only necessary that the change of colour in each feather should take place but once in the course of its connection with the bird†."

* Transactions of the Linnean Society of London, vol. xii, p. 524.

† The Philosophy of Zoology, vol. ii, p. 28.

Now we cannot but consider this succession of moultings as at variance with the remarks of the Rev. Mr Whitear, on the *Larus ridibundus*; for the latter naturalist does not tell us, that there was a uniformity of hue in the same feather; but on the contrary, that “the same feather retained some of the brown of the imperfect bird, together with the light blue ash-colour of the adult state;” and that “the two colours prevailed in various degrees.”

But why resort to all these conjectures to account for a supposed succession of plumage, when it is admitted that a change of colour may take place independent of moulting? In the greater part of those birds whose colours are uniform throughout the year, naturalists admit but of one moulting. Is there any physical necessity, then, for *two* moultings in the course of a year?—or even *three*, as some pretend? I know of none.

Montagu informs us, that he had kept a Herring Gull for several years, for the purpose of witnessing its change of plumage. This naturalist had previously asserted, that he had “*no conception of the feathers themselves changing colour**,” hence, when a change was perceptible, he tells us, that “the partial spring *moulting* of his Herring Gull commenced about the middle of February†;” a season in which all animals, in climates like ours, require an abundant supply of clothing, to obviate the effects of those vicissitudes of weather, to which they are constantly exposed. Montagu was a close observer; and had his mind not been under the influence of a theory, we are persuaded that he would have endeavoured to ascertain, whether the winter change of his Gull was the result of moulting or not. Nature administers liberally to the wants of her creatures, having a due regard to seasons and circumstances. Those animals which possess the means of migrating from cold to temperate climates, are not as abundantly provided with clothing as those which are compelled to re-

* Introduction to the Ornithological Dictionary.

† Supplement to the Ornithological Dictionary.

main. Quadrupeds and Birds, which hyemate in high northern latitudes, are well known to be supplied with a covering of extraordinary thickness and warmth; and this winter garb suffers no diminution, until the return of that temperature, which will enable the animal to dispense with it without inconvenience.

There is one more remark which we would make on this head. When in the act of moulting, birds are greatly sensible of cold: an unseasonable decrease of temperature drives them to shelter; and their actions give evidence that they are not yet prepared for such vicissitudes. In the case of those which meet with an accidental loss of plumage in the winter, until this loss is supplied, they are observed to be distressed: they seek sheltered retreats, and sunny exposures; they lose their wonted activity; and, like an animal which suffers a wound, they appear to have their attention completely absorbed by their situation.

But Montagu himself affords us one of the most apposite illustrations of the fact of a change of colour in mature plumage, that could well be desired. In the month of May, he was presented with a Black Stork, which had been taken in England. In June, he perceived some indication of a change of plumage. "The bird," says he, "continued very gradually to moult throughout the summer and winter, becoming much darker on the head and neck, and much greener on the back; and, by the beginning of February, the upper part of the head, and back of the neck, became dusky-black, glossed with green; the lower neck before dusky-black, and the whole upper part of the body, including wing-coverts and scapulars, dark shining green, similar in colour to that variety of the Glossy Ibis, known under the title of *Tantalus viridis*. The upper parts of the plumage continued as at first.

"Indisposition," continues he, "having prevented my seeing the bird since the last mentioned period, till the middle of March, I was much surprised to find the appearance of a few feathers, on the upper part of the back, that were dusky,

resplendent with violet and purple, having a margin of dark glossy green. These elegant feathers continued to increase in number, till the whole upper part of the back had nearly assumed this beautiful plumage by the first of April. At this time no other part of the bird indicated any further change of plumage: the scapulars and coverts, many of which had recently changed, continued of the same colour as last described, without the purple reflections or marginal green. It is scarcely possible to account for such a succession of change in plumage in so short a time, except by supposing, that a change in the constitution of the bird, produced by captivity, and a want of natural food, had caused obstruction to the usual course of moulting; and that the autumnal change had been retarded, and was scarcely effected before the spring moulting commenced*."

With regard to the above, we would remark, that the supposition of a retardation of the autumnal moulting is totally inadmissible, inasmuch as the author distinctly states, from autoptical experience, that "the bird continued very gradually to moult throughout the summer and winter." And that there was no want of *natural food* in its state of captivity, we learn from the history of its habits, detailed by Montagu himself, in the preceding part of the paper above quoted. Let it also be observed, that all the species of the genus *Ciconia*, as well as of the genus *Ardea*, are acknowledged to cast their feathers but once a year, and that in the autumn.

It being now satisfactorily proved, that a change of colour obtains, in *some* birds, in the winter, and the spring, without a change of plumage; I am disposed to conclude, that the state of MOULTING, properly so called, takes place, in all birds, but once a year.

* Some Remarks on the Natural History of the Black Stork, &c. Transactions of the Linnean Society of London, vol. xii, p. 19.